educational courses offered for credit to enrolled students of accredited schools, with limited exceptions as set forth in paragraph (e)(9) of this section and §§74.990 through 74.992 of this part.

(2) * * *

(b) Such stations may also be used for the additional purpose of transmitting other visual and aural educational, instructional and cultural material to selected receiving locations, including in-service training and instruction in special skills and safety programs, extension of professional training, informing persons and groups engaged in professional and technical activities of current developments in their particular fields, and other similar endeavors, and for transmitting associated information from ITFS response stations to response station hubs.

* * * * *

(e) A licensee may use excess capacity on each channel to transmit material other than the ITFS subject matter specified in paragraphs (a), (b), (c), and (d) of this section subject to the following conditions:

(1) * * *

(2) If the time or capacity leased is to be used for "wireless cable" operations (the provision of video, voice and/or data services to subscribers), before leasing excess capacity on any one channel, the licensee must provide at least 20 hours per week of ITFS programming on that channel, except as provided in paragraph (e)(3) of this section. All hours not used for ITFS programming may be leased to a "wireless cable" operator. An additional 20 hours per week per channel must be reserved for recapture by the ITFS licensee for its ITFS programming, subject to one year's advance, written notification by the ITFS licensee to its "wireless cable" lessee. These hours of recapture are not restricted as to time of day or day of the week, but may be established by negotiations between the ITFS licensee and the "wireless cable" lessee.

* * * * *

(9) A licensee may shift its requisite ITFS programming onto fewer than its authorized number of channels, via channel mapping technology or channel loading, so that it can lease full-time channel capacity on its ITFS station, associated ITFS booster stations or on ITFS response stations and associated response station hubs to a wireless cable operator, subject to the condition that it provide a total average of at least 20 hours per channel per week of ITFS programming either on its authorized channels or on channels not authorized to it, but which are included in the wireless system of which it is a part. The use of channel mapping or channel loading in accordance with the preceding sentence shall not be considered adversely to the ITFS licensee in seeking a license renewal or otherwise. The licensee also retains the unbridgeable right to recapture, subject to six months' written notification to the wireless cable operator, an average of an additional 20 hours per channel per week for simultaneous programming on the

number of channels for which it is authorized. The licensee may agree to the transmission of this recapture time on channels not authorized to it, but which are included in the wireless system of which it is a part.

* * * * *

29. Sections 74.936 would be revised in its entirety to read as follows:

§74.936 Emissions and bandwidth.

(a) An instructional television fixed station shall normally employ amplitude modulation (C3F) for the transmission of the visual signal and frequency modulation (F3E) or (G3E) for the transmission of the aural signal when transmitting a standard television signal. For purposes other than standard television transmission, different types of emissions may be authorized if the applicant describes fully the modulation and bandwidth desired, and demonstrates that the bandwidth desired is no wider than needed to provide the intended service.

(b) On or after November 1, 1991, the maximum out-of-band power of a transmitter or of a booster transmitting on a single channel with effective isotropic radiated power in excess of -9 dBW operating in this service utilizing analog modulation shall be attenuated 38 dB relative to the peak visual carrier at the channel edges and constant slope attenuation from this level to 60 dB relative to the peak visual carrier at 1 MHz below the lower band and 0.5 MHz above the upper band edge. All out-of-band emissions extending beyond these frequencies shall be attenuated at least 60 dB below the peak visual carrier power. The maximum out-of-band power of a transmitter or of a booster transmitting on a single channel or portion thereof with effective isotropic radiated power in excess of 9 dBW employing digital modulation shall be 38 dB attenuation relative to the licensed average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at the licensed channel edges, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower licensed channel edges, and 60 dB attenuation below the licensed average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at all other frequencies. Notwithstanding the foregoing, in situations where a booster station transmits, or where adjacent channel licensees jointly transmit, over more than one channel utilizing digital modulation, the maximum out-of-band power shall be 38 dB attenuation relative to the licensed average power level of each channel at the channel edges of those combined channels, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower edges of those combined channels, and 60 dB attenuation below the licensed average power level of each channel at all other frequencies. However, should interference occur as a result of emissions outside the assigned channel, additional attenuation may be required. A transmitter licensed prior to November 1, 1991, that remains at the station site initially licensed, and does not comply with this subsection, may continue to be used for its life if it does not cause harmful interference to the operation of any other licensee. Any non-conforming transmitter replaced after November 1, 1991, shall be replaced by a transmitter meeting the requirements of this subsection.

(c) The maximum out-of-band power of a booster transmitting on multiple channels carrying separate signals (a broadband booster) with an effective isotropic radiated power in excess of -9 dBW, employing either analog or digital modulation, shall be attenuated 38 dB relative to the peak visual carrier at the channel edges of channels occupied by analog signals and relative to the licensed average power level at the edges of channels occupied by digital signals. Within unoccupied channels within the overall passband of the booster, the maximum out-of-band power shall be attenuated 50 dB at 3 MHz above the upper and below the lower edges of occupied channels. For boosters operating in the range 2.500-2.690 GHz, the maximum out-of-band power shall be attenuated 50 dB at 3 MHz above the upper and below the lower of these frequencies, constant slope attenuation to 60 dB at 20 MHz above the upper and below the lower of these frequencies, and 60 dB attenuation at all frequencies beyond. Boosters operating with an effective isotropic radiated power less than -9 dBW shall have no particular out-of-band power attenuation requirement, except that if they cause harmful interference, their operation shall be terminated within 2 hours upon notification by the Commission until the interference can be cured.

(d) The maximum out-of-band power of a response station using all or part a 6 MHz channel and employing digital modulation shall be 38 dB attenuation relative to the rated power level at the 6 MHz channel edges, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower channel edge, and 60 dB attenuation below the rated power level at all other frequencies. Notwithstanding the foregoing, in situations where response stations transmit over more than one 6 MHz channel utilizing digital modulation, the maximum out-of-band power shall be 38 dB attenuation relative to the rated power level within each channel at the channel edges of those combined channels, constant slope attenuation from that level to 60 dB attenuation at 3 MHz above the upper and below the lower edges of those combined channels, and 60 dB attenuation below the rated power level of each channel at all other frequencies. Notwithstanding either of the two foregoing sentences, the out-of-band power for discrete spurious signals above the upper and below the lower channel edge shall not be less than 40 dB attenuation, provided that such signals occur no more frequently than once in any 10 MHz within 50 MHz of a channel edge and none occur more than 50 MHz from a channel edge). However, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required.

(e) The requirements of §73.687(c)(2) will be considered to be satisfied insofar as measurements of operating power are concerned if the transmitter is equipped with instruments for determining the combined visual and aural operating power. However, licensees are expected to maintain the operating powers within the limits specified in §74.935. Measurements of the separate visual and aural operating powers must be made at sufficiently frequent intervals to insure compliance with the rules, and in no event less than once a month. However, the provisions of §73.687(c)(2) and of this subsection shall not be applicable to ITFS response stations or to low power ITFS booster stations authorized pursuant to §74.985(e).

30. In Section 74.937, paragraphs (a) and (b) would be revised to read as follows:

§74.937 Antennas.

(a) In order to minimize the hazard of harmful interference from other stations, directive receiving antennas should be used at all receiving locations other than response station hubs. The choice of receiving antennas is left to the discretion of the licensee. However, for the purpose of interference calculations, except as set forth in §74.939, the general characteristics of the reference receiving antenna shown in Figure 1 of this section (i.e., a 0.6 meter (2 foot) parabolic reflector antenna) are assumed to be used in accordance with the provisions of §74.903(a)(3) unless pertinent data is submitted of the actual antenna in use at the receive site. Licensees may install receiving antennas with general characteristics superior to those of the reference receive antenna. Nevertheless, should interference occur and it can be demonstrated by an applicant that the existing antenna at the receive site is inappropriate, a more suitable yet practical receiving antenna should be installed. In such cases, the modification of the receive site will be in the discretion, and will be the responsibility, of the licensee serving the site.

(b) Except as set forth in §74.931(e)(7), directive transmitting antennas shall be used whenever feasible so as to minimize interference to other licensees. The radiation pattern shall be designed to minimize radiation in directions where no reception is intended. When an ITFS station is used for point-to-point service, an appropriate directional antenna must be used.

* * * * *

31. Section 74.938 would be revised to read as follows:

§74.938 Transmission Standards.

The width of an ITFS channel is 6 MHz. However, the licensee may subchannelize its authorized bandwidth, provided that digital modulation is employed and the aggregate power does not exceed the authorized power for the channel, and may utilize all or a portion of its authorized bandwidth for ITFS response stations authorized pursuant to §74.939. The licensee may also, jointly with affected adjacent channel licensees, transmit utilizing bandwidth in excess of its authorized bandwidth, provided that digital modulation is employed, all power spectral density requirements set forth in this Part are met and the out-of-band emissions restrictions set forth in §74.936 are met at the edges of the channels employed. ITFS transmitters must be type accepted by the Commission for the particular signals that will be employed in actual operation. Either the manufacturer or the licensee must obtain transmitter type acceptance for the transmitter by filing an application for type acceptance with appropriate information concerning the signal waveforms and measurements.

* * * * *

32. Section 74.939 would be revised in its entirety to read as follows:

§74.939 Special rules governing ITFS response stations.

(a) An ITFS response station is authorized to provide communication by voice, video and/or data signals with its associated ITFS response station hub. An ITFS response station may be operated only by the licensee of an instructional television fixed station and only at an authorized receiving location of the instructional television fixed station, by any lessee of excess capacity, or by a subscriber of any lessee of excess capacity. More than one ITFS response station may be operated at the same or different locations by the same licensee. The specific frequency channel may be subdivided to provide a distinct operating frequency for each of more than one response station, provided that digital modulation is employed and the aggregate power does not exceed the authorized power for the channel. An ITFS response station may also transmit utilizing bandwidth in excess of that authorized to the licensee jointly with effective adjacent channel licensees, provided that digital modulation is employed, all power spectral density requirements set fort in this Part are met and the out-of-band emission restrictions set forth in §74.936 are complied with.

(b) ITFS response stations that utilize the bands 2500-2650 MHz, 2656-2662 MHz, 2668-2674 MHz and/or 2680-2686 MHz or the 125 KHz channels identified in §74.939(f) may be installed and operated without an individual license to communicate with a response station hub authorized to an ITFS licensee under a response station hub authorization, provided that the conditions set forth in §74.939(f) are complied with and that ITFS response stations operating in the bands 2500-2650 MHz, 2656-2662 MHz, 2668-2674 MHz and/or 2680-2686 MHz only employ digital modulation.

(c) An application for a response station hub authorization shall be filed with the Commission in Washington, D.C., on FCC Form 330. Section VI of that form shall supply the following information for each response station hub:

(1) The geographic coordinates, street address, and the height of the center line of the reception antenna(s) above mean sea level for the response station hub; and

(2) A specification of:

(i) The response service area in which the applicant or its lessee proposes to install ITFS response stations to communicate with the response station hub, any regions into which the response service area will be subdivided for purposes of interference analysis, and any regional classes of response station characteristics which will be used to define the operating parameters of groups of response stations within each region for purposes of interference analysis, including:

(A) the maximum height above ground level of the transmission antenna that will be employed by any response station in the regional class and that will be used in interference analyses without the receipt of additional, site- specific authorization; and

(B) the maximum equivalent isotropic radiated power (EIRP) that will be employed by any response station in the regional class and that will be used in interference analyses; and

(C) any sectorization that will be employed, including the polarization to be employed by response stations in each sector and the geographic orientation of the sector boundaries, and that will be used in interference analyses; and

(D) the combined worst-case outer envelope plot of the patterns of all models of response station transmission antennas that will be employed by any response station in the regional class to be used in interference analyses; and

(E) the maximum number of response stations that will be operated simultaneously in each region using the characteristics of each regional class applicable to each region.

(ii) The channel plan (including any guardbands at the edges of the channels) to be used by ITFS response stations in communicating with the response station hub, including a statement as to whether the applicant will employ the same frequencies on which response stations will transmit to also transmit on a point-to-multipoint basis from an MDS station or MDS booster station; and

(iii) The minimum received signal level that the proposed response station hub can actually utilize in the provision of service, specified in $dBW/m^2/Hz$; and

(3) A demonstration that:

(i) The proposed response station hub is within the protected service area of the ITFS station whose channels will be used for communications to the response station hub (for purposes of this rule, an ITFS station that is not engaged in leasing of excess capacity will be deemed to have a 35 mile radius protected service area centered at its transmitter site) or, in the case of an application for response stations to utilize one or more of the 125 kHz response channels, the response station hub is within the protected service area of the station authorized to utilize the associated channel; and

(ii) The entire proposed response service area is within the protected service area of the ITFS station whose channels will be used for communications to the response station hub, (for purposes of this rule, an ITFS station that is not engaged in leasing of excess capacity will be deemed to have a 35 mile radius protected service area centered at its transmitter site) or, in the alternative, the applicant may demonstrate that the licensee of any protected service area which is overlapped by the proposed response service area has consented to such overlap. In the case of an application for response stations to utilize one or more of the 125 kHz response channels, such demonstration shall establish that the response service area is entirely within the protected service area of the station authorized to utilize the associated 125 kHz channel, or, in the alternative, that the licensee entitled to any cochannel protected service area which is overlapped by the proposed response service area has consented to such overlap; and

(iii) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hubs will not generate a power flux density in excess of -73 dBW/m² (or the pro rata power spectral density equivalent based on the bandwidth actually employed in those cases where less than a 6 MHz channel is to be employed (e.g., -89.8 dBW/m² for 125 kHz channels or subchannels)) outside the boundaries of the applicant s protected service area, except to the extent that consents have been granted pursuant to §74.931(b)(1)(B)(ii) to an extension of the response service area beyond the boundaries of the protected service area; and

(iv) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 45 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths)

(A) within the protected service area of any authorized or previously proposed cochannel MDS or ITFS station with center coordinates located within 160.94 km (100 miles) of the proposed response station hub,

(B) within the booster service area of any cochannel booster station entitled to such protection pursuant to §§21.913(f) or 74.985(f), or

(C) at any cochannel response station hub entitled to such protection pursuant to §§21.909(h) or 74.939(g), or, in the alternative, that the licensee of or applicant for such cochannel station or hub consents to such application; and

(v) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 0 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) (i) within the protected service area of any authorized or previously proposed adjacent channel MDS or ITFS station with center coordinates located within 160.94 km (100 miles) of the proposed response station hub, (ii) within the booster service area of any adjacent channel booster station entitled to such protection pursuant to §§21.913(f) or 74.985(f), or (iii) at any adjacent channel response station hub entitled to such protection pursuant to §§21.909(h) or 74.939(g), or, in the alternative, that the licensee of or applicant for such adjacent channel station or hub consents to such application; and

(vi) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 45 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at any registered receive site of any authorized or previously-proposed cochannel ITFS station located within 80 km (50 miles) of the proposed response station hub, or, in the alternative, that the licensee of or applicant for such cochannel station or hub consents to such application; and

(vii) The combined signals of all ITFS response stations within all response service areas and oriented to transmit towards their respective response station hub will result in a desired to undesired signal ratio of at least 0 dB (or the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at any registered receive site of any authorized or previously-proposed adjacent channel ITFS station located within 80 km (50 miles) of the proposed response station hub, or, in the alternative, that the licensee of or applicant for such adjacent channel station or hub consents to such application; and

(viii) The proposed response station hub can receive transmissions from the response service area without interference.

(4) A certification that the application has been served upon

(i) the licensee of any station (including any booster station or response station hub) with a protected service area which is overlapped by the proposed response service area;

(ii) the holder of any authorization (including any booster station or response station hub authorization) with a protected service area that adjoins the applicant s protected service area;

(iii) every licensee of or applicant for

(A) any authorized or previously proposed incumbent MDS or ITFS station with a 56.33 km (35 miles) protected service area with center coordinates located within 160.94 km (100 miles) of the proposed response station hub, or

(B) any associated booster station or response station hub authorized to the holder of a license for a facility described in (A); and

(iv) every licensee of or applicant for any authorized or previously proposed ITFS station (including any booster station or response station hub) located within 80 km (50 miles) of the proposed response station hub

(d) Applications for response station hub authorizations meeting the requirements of §74.939(c) shall be deemed minor change applications and shall cut-off applications that are filed on a subsequent day for facilities that would cause harmful electromagnetic interference to the proposed response station hubs. A response station hub shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application for the response station hub authorization is filed. Response stations shall not be required to protect from interference facilities proposed on or after the day the application for the response station hub authorization is filed.

(e) Notwithstanding the provisions of §74.912 and except as provided by §74.911(e), any petition to deny an application for a response station hub authorization shall be filed no later than the

sixtieth (60th) day after the date of public notice announcing the filing of such application or major amendment thereto.

(f) An ITFS response station hub authorization establishing a response service area shall be conditioned upon compliance with the following:

(1) No ITFS response station shall be located beyond the response service area of the response station hub with which it communicates; and

(2) No ITFS response station shall operate with an EIRP in excess of that specified in the application for the response station hub pursuant to §74.939(c)(2)(i)(B) for the particular regional class of characteristics with which the response station is associated, and such response station shall not operate at an excess of 18 dBW EIRP without a demonstration that no interference shall occur from that facility operating at a higher power level; and

(3) Each ITFS response station shall employ a transmission antenna oriented towards the response station hub with which the ITFS response station communicates, and such antenna shall be no less directional than the worst case outer envelope pattern specified in the application for the response station hub pursuant to §74.939(c)(2)(i)(D) for the regional class of characteristics with which the response station is associated; and

(4) The combined out-of-band emissions of all response stations using all or part of a 6 MHz channel and employing digital modulation shall comply with §74.936(c). The combined out-of-band emissions of all response stations using a 125 kHz channel shall comply with §74.939(i). However, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required; and

(5) The response stations transmitting simultaneously at any time within any given region of the response service area utilized for purposes of analyzing the potential for interference by response stations shall conform to the numerical limits for each class of response station proposed in the application for the response station hub authorization; Notwithstanding the foregoing, the licensee of a response station hub authorization may alter the number of response stations of any class operating simultaneously in a given region without prior Commission authorization, provided the licensee first notifies the Commission of the altered number of response stations of such class(es) to be operated simultaneously in such region, provides the Commission with an analysis establishing that such alteration will not result in any increase in electrical interference to any existing or proposed MDS or ITFS station, booster station or response station hub or to any MDS Basic Trading Area or Partitioned Service Area authorization holder entitled to protection pursuant to §74.939(c)(3), or that the applicant or licensee of such facility has consented to such interference, and serves a copy of such notification and analysis upon each party entitled to be served pursuant to §74.939(c)(4).

(g) See Part 17 of this chapter concerning notification to the Federal Aviation Administration of proposed antenna construction or alteration. The provisions of §§74.967 and 74.981(a)(5) of

this subpart, concerning antenna painting and lighting requirements, apply to ITFS response stations as well as main ITFS stations.

(h) Commencing upon the filing of an application for an ITFS response station hub authorization and until such time as the application is dismissed or denied or, if the application is granted, a certificate of completion of construction is filed, the incumbent ITFS station whose channels are being utilized shall be entitled both to interference protection pursuant to §§21.902(b)(3) and (4), 21.938(b)(2) and 74.903, and to protection of the response station hub pursuant to the following provisions of this subsection. Upon the filing of a certificate of completion of construction of an ITFS response station hub, unless the application for the response station hub authorization specifies that the same frequencies will be employed for transmissions from ITFS response stations and point-to- multipoint transmissions from ITFS stations and/or ITFS booster stations, the ITFS station whose channels are being utilized shall no longer be entitled to interference protection pursuant to §§21.902(b)(3) and (4), 21.938(b)(2) and 74.903 within the response service area with regard to any portion of any 6 MHz channel employed for response station communications. In such situations, in lieu of the requirements set forth in §§21.902, 21.938(b)(2) and 74.903, an applicant for any new or modified MDS or ITFS station (including any response station or booster station) shall be required to demonstrate that the predicted desired to undesired signal ratio at the response station hub of each previously-proposed response service area to which the proposed new or modified MDS or ITFS station has an unobstructed signal path will be at least 45 dB cochannel or 0 dB adjacent channel (or the appropriately adjusted values based upon the ratios of the channel-to-subchannel bandwidths). In making such demonstration, the applicant shall assume installation of an omnidirectional unity gain plane-polarized receive antenna mounted with its centerline as specified in the application for the response station hub in lieu of the reference antenna specified in §§21.902 and 74.903. Upon the filing of a certificate of completion of construction of an ITFS response station hub where the application for the response station hub authorization specifies that the same frequencies will be employed for transmissions from ITFS response stations and from ITFS stations and ITFS booster stations, the ITFS station whose channels are being utilized shall be entitled both to interference protection pursuant to §§21.902, 21.938(b)(2) and 74.903 and to protection of the response station hub pursuant to the preceding provisions of this subsection.

(i) ITFS response stations may operate on either all or part of a 6 MHz channel assigned a licensee, on any 125 kHz channel assigned a licensee, or on adjacent frequencies authorized to multiple licensees where such stations are operated jointly. The 125 kHz channels listed in the following table shall be assigned to the licensees of MDS and ITFS stations for use as response stations or for licensing for point-to-multipoint transmissions, in accordance with the table. The specified 125 kHz frequency channel may be subdivided to provide a distinct operating frequency for each of more than one station, may be combined with adjacent channels, or may be exchanged with the licensee of another MDS or ITFS station for use of another 125 kHz channel assigned to the other licensee.

Frequency (MHz)	Primary Channel Designation	125 kHz Channel Designation
2686.0625	A1	H4a

2686.1875	B1	H4b
2686.3125	C1	H4c
2686.4375	D1	H4d
2686.5625	E1	H4e
2686.6875	F1	H4f
2686.8125	G1	H4g
2686.9375	H1	H4h
2687.0625	A2	H4i
2687.1875	B2	H4j
2687.3125	C2	H4k
2687.4375	D2	H4l
2687.5625	E2	H4m
2687.6875	F2	H4n
2687.8125	G2	H4o
2687.9375	H2	H4p
2688.0625	A3	H4q
2688.1875	B3	H4r
2688.3125	C3	H4s
2688.4375	D3	H4t
2688.5625	E3	H4u
2688.6875	F3	H4v
2688.8125	G3	H4w
2688.9375	H3	H4x
2689.0625	A4	H4y
2689.1875	B4	H4z
2689.3125	C4	H4aa
2689.4375	D4	H4bb
2689.5625	E4	H4cc
2689.6875	F4	H4dd
2689.8125	G4	H4ee

(j) An 125 kHz wide ITFS response channel is 125 kHz wide and is centered at the assigned frequency. If amplitude modulation is used, the carrier shall not be modulated in excess of 100%. If frequency modulation is used, the deviation shall not exceed ± 25 kHz. Any emissions outside the channel shall be attenuated at the channel edges at least 60 dB 35 dB below peak output power when analog modulation is employed or 35 dB below average output power when digital modulation is employed (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths). Any emissions more than 125 kHz from either channel edge, including harmonics, shall be attenuated at least 60 dB below peak output power when analog modulation is employed or 60 dB below average output power when digital modulation is employed (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths). Notwithstanding the foregoing, in situations where adjacent channel licensees jointly transmit over more than one channel utilizing digital modulation, the maximum out-of-band power shall be 35 dB attenuation relative to the licensed average power level of each channel at the channel edges of those combined channels. Emissions more than 125 kHz from either edge of the combined channels, including harmonics, shall be attenuated at least 60 dB below peak analog power or average digital power of each channel, as appropriate. Notwithstanding the foregoing, the out-of-band power for

discrete spurious signals above the upper and below the lower channel edge shall not be less than 40 dB attenuation, provided that such signals occur no more frequently than once in any 10 MHz within 50 MHz of a channel edge and none occur more than 50 MHz from a channel edge). Different types of emissions may be authorized for use on 125 kHz wide channels if the applicant describes fully the modulation and bandwidth desired, and demonstrates that the modulation selected will cause no more interference than is permitted under this subsection. Greater attenuation may be required if interference is caused by out-of-channel emissions.

(k) The transmitter of an ITFS response station may be operated unattended. The overall performance of the ITFS response station transmitter shall be checked as often as necessary to ensure that it is functioning in accordance with the requirements of the Commission's rules. The licensee of an ITFS response station hub is responsible for the proper operation of the transmitters of associated response stations at all times. The transmitters shall be installed and protected in such manner as to prevent tampering or operation by unauthorized persons.

(l) The transmitting apparatus employed at ITFS response stations shall have received type acceptance in accordance with §74.952.

(m) An ITFS response station shall be operated only when engaged in communication with its associated ITFS response station hub or ITFS station, or for necessary equipment or system tests and adjustments. Radiation of an unmodulated carrier and other unnecessary transmissions are forbidden.

Note 1: For purposes of subsections (c)(3)(i), (ii), and (iii), an ITFS station that is not engaged in leasing of excess capacity will be deemed to have a 35 mile radius protected service area centered at its transmitter site.

Note 2: Calculations required under this rule shall be performed in accordance with Method For Predicting Accumulated Signal Power From a Multiplicity of Statistically-located Transmitters as published as Attachment _ to the [cite to the Report and Order adopting proposed rules].

33. In Section 74.950, current paragraphs (a) through (e) would be deleted in their entirety and current paragraph (f) would be redesignated as paragraph (a).

34. In Section 74.951, paragraph (b) would be revised to read as follows:

§74.951 Modification of transmission systems.

* * * * *

(b) Any change in the antenna system affecting the direction of radiation, directive radiation pattern, antenna gain, or radiated power; provided, however, that a licensee may install a sectorized antenna system without prior consent if such system does not change polarization or

result in an increase in radiated power by more than one dB in any direction and notice of such installation is provided to the Commission on FCC Form 330 within ten (10) days of installation.

* * * * *

35. In Section 74.961, paragraph (a) would be revised to read as follows:

§74.961 Frequency tolerance.

(a) The frequency of the visual carrier for any ITFS station or ITFS booster station authorized pursuant to §74.985(b) shall be maintained within ±1 kHz of the assigned frequency at all times when the station is in operation. ITFS booster stations authorized pursuant to §74.985(e) and ITFS response stations authorized pursuant to §74.939 shall employ transmitters with sufficient frequency stability to ensure that the emission stays within the authorized frequency block. A transmitter licensed prior to November 1, 1991, that remains at the station site initially licensed and does not comply with this paragraph may continue to be used for its life if it does not cause harmful interference to the operation of any other licensee. Any non-conforming transmitter replaced after November 1, 1991, must be replaced by a transmitter meeting the requirements of this paragraph.

* * * * *

36. Section 74.965 would be revised to read as follows.

§74.965 Posting of station license.

(a) The instrument of authorization, a clearly legible photocopy thereof, or the name, address and telephone number of the custodian of the instrument of authorization shall be available at each station and response station hub. Each authorized operator of an ITFS booster station shall post at the booster station the name, address and telephone number of the custodian of the notification filed pursuant to §74.985 if such notification is not maintained at the booster station.

(b) If an ITFS station, an ITFS booster station or an ITFS response station hub is operated unattended, the call sign and name of the licensee shall be displayed such that it may be read within the vicinity of the transmitter enclosure or antenna structure.

37. Section 74.982 would be deleted in its entirety.

38. Section 74.985 would be revised in its entirety to read as follows:

§ 74.985 Signal booster stations.

(a) Authorizations for Instructional Television Fixed Service (ITFS) booster stations may be granted to an ITFS licensee, or to a third party with a fully-executed lease agreement with an

ITFS applicant or licensee in the case of booster stations authorized pursuant to §74.985(e). The eligibility requirements of §74.932 will not apply to such third-party booster station applicants. An ITFS booster station may reuse channels to repeat the signals of ITFS stations or for the origination of signals on ITFS channels except as provided for in §74.985(e), but no booster station may be authorized for the reuse of channels authorized to an ITFS station without the written consent of the licensee of the station whose channels are reused, and such consent must be included with the booster station application. The aggregate power flux density generated by an ITFS station and all associated signal booster stations may not exceed -73 dBW/m² (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at or beyond the boundaries of the protected service area of the ITFS station whose channel is being reused, as measured at locations for which there is an unobstructed signal path. For purposes of the preceding sentence and §§74.985(b)(1) and (2) and (c)(5) and (6), an ITFS station will be deemed to have a protected service area pursuant to §21.902(d) regardless of whether it is leasing excess capacity.

(b) Any ITFS licensee may secure an authorization for an ITFS signal booster that has a maximum power level in excess of -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) by submitting an application on FCC Form 330 and including, in addition to the requirements of that form:

(1) A demonstration that the proposed signal booster station site is within the protected service area, as defined in §§21.902(d) of this chapter, of the ITFS station whose channels are to be reused; and

(2) A demonstration that the booster service area is entirely within the protected service area of the ITFS station whose channels are being reused, or in the alternative, that the licensee entitled to any cochannel protected service area which is overlapped by the proposed booster service area has consented to such overlap; and

(3) A demonstration that the booster service area can be served by the proposed booster without interference; and

(4) A demonstration that the aggregate power flux density of the ITFS station and all associated booster stations does not exceed -73.0 dBW/m² at (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) or beyond the edge of the a protected service area for the primary ITFS transmitter station, as defined by §21.902(d) of this chapter, whose channels are to be reused; and.

(5) In lieu of the requirements of §74.903, a demonstration that the proposed signal booster station will cause no harmful interference to co-channel or adjacent-channel, authorized or previously-proposed ITFS, MDS, or MMDS stations with protected service area center coordinates as specified in §21.902(d) or, in the case of ITFS stations without protected service areas, transmitters within 160.94 kilometers (100 miles) of the proposed booster station's

transmitter site, or any ITFS or MDS response station hubs or booster stations within 160.94 kilometers (100 miles) of the proposed booster station's transmitter site. In the alternative, a statement from the MDS or ITFS licensee or conditional licensee stating that it does not object to operation of the ITFS signal booster station may be submitted; and

(6) A specification of the area to be served by the booster (the booster service area), which may not overlap the booster service area of any other booster authorized to or proposed by the applicant, and a demonstration that the booster service area is entirely within the protected service area of the station whose channels are being reused and can be served by the proposed booster without interference; and

(7) A certification that copies of the materials set forth in §94.985(b) have been served upon the licensee, conditional licensee or permittee of each station (including each response station hub and booster station) required to be studied pursuant to §74.985(b)(3).

(c) Notwithstanding the provisions of §74.911(c)(1), applications for booster station authorizations may be filed at any time. Notwithstanding any other provision of Part 74, applications for booster authorizations meeting the requirements of §74.985(b) shall cut-off applications that are filed on a subsequent day for facilities that would cause harmful electromagnetic interference to the proposed booster stations. A booster station shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application for the booster station authorization is filed. Booster stations shall not be required to protect from interference facilities proposed on or after the day the application for the response station hub authorization is filed.

(d) Notwithstanding the provisions of §74.912 and except as provided in §74.911(e), any petition to deny an application for a response station hub authorization shall be filed no later than the sixtieth (60th) day after the date of public notice announcing the filing of such application or major amendment thereto.

(e) A signal booster station that has a maximum power level of -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) may be installed and operated by an ITFS conditional licensee or licensee for the purpose of retransmitting the signals of the ITFS station or for originating signals. A signal booster station that has a maximum power level of -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) may be installed and operated by a third party with a fully-executed lease or consent agreement with an ITFS conditional licensee or licensee for the purpose of retransmitting the signals of the ITFS station. In either case, such installation and operation shall be subject to the condition that for sixty (60) days after installation, no objection or petition to deny is filed by an authorized co-channel or adjacent-channel ITFS or MDS station with a transmitter within 8.0 kilometers (5 miles) of the coordinates of the signal booster. An eligible party seeking to install a signal booster under this rule must, within 48 hours after installation, submit

(1) a description of the signal booster technical specifications (including an antenna envelope plot or, if the envelope plot is on file with the Commission, the make and model of the antenna, antenna gain and azimuth), the coordinates of the booster, the height of the center of radiation above mean sea level, the street address of the signal booster, and a description of the area to be served by the booster (the booster service area),

(2) a demonstration that the booster service area is entirely within the protected service area of the station whose channels are being reused, or, in the alternative, that the licensee entitled to any protected service area which is overlapped by the proposed booster service area has consented to such overlap,

(3) either a certification that no Federal Aviation Administration determination of No Hazard to Air Navigation is required under Part 17 of this chapter or, if such determination is required, either:

(i) a statement of the FCC Antenna Structure Registration Number; or

(ii) if an FCC Antenna Structure Registration Number has not been assigned for the antenna structure, the filer must indicate the date the application by the antenna structure owner to registered the antenna structure was filed with the FCC in accordance with Part 17 of this chapter; (iv) a demonstration that the proposed booster service area can be served by the proposed booster without interference, and (v) a certification that:

(A) The maximum power level of the signal booster transmitter does not exceed -9 dBW EIRP (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths); and

(B) No registered receiver of an ITFS E or F channel station, constructed prior to May 26, 1983, is located within a 1 mile (1.61 km) radius of the coordinates of the booster, or in the alternative, that a consent statement has been obtained from the affected ITFS licensee; and

(C) No environmental assessment location as defined at §1.1307 of this chapter is affected by installation and/or operation of the signal booster; and

(D) Each MDS and/or ITFS station licensee (including the licensees of booster stations and response station hubs) with protected service areas or registered receivers within a 8 km (5 mile) radius of the coordinates of the booster has been given notice of its installation; and

(E) The signal booster site is within the protected service area of the ITFS MDS station whose channels are to be reused, if the signal of an MDS station is repeated; and

(F) The aggregate power flux density at or beyond the boundary edge of the protected service area of the ITFS station whose channels are to be reused and associated booster stations does not exceed -73.0 dBW/m^2 (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) at locations for which there is an unobstructed signal path and

(G) The antenna structure will extend less than 6.10 meters (20 feet) above the ground or natural formation or less than 6.10 meters (20 feet) above an existing manmade structure (other than an antenna structure); and

(H) The ITFS licensee understands and agrees that in the event harmful interference is claimed by the filing of an objection or petition to deny, the licensee must terminate operation within two (2) hours of written notification by the Commission, and must not recommence operation until receipt of written authorization to do so by the Commission.

(f) An applicant for any new or modified MDS or ITFS station (including any response station authorization or booster station) shall demonstrate compliance with the protected service area protection requirements set forth in §§21.902, 21.938 and 74.903 with respect to any previously proposed or authorized booster service area using the transmission parameters of the ITFS booster station (including EIRP, polarization(s) and antenna height). Upon the filing of a certificate of completion of construction of an ITFS booster station filed pursuant to §74.985(b) or upon the filing of an ITFS booster station notification pursuant to §74.985(e), each incumbent ITFS station whose channels are being reused by the ITFS signal booster shall no longer be entitled to interference protection pursuant to §§21.902(b)(3) and (4), 21.938(b)(2) and (3) and 74.903 within the booster service area based on the transmission parameters of the ITFS station whose channels are being reused. A booster station shall not be entitled to protection from interference caused by facilities proposed on or prior to the day the application or notification for the booster station is filed. Booster stations shall not be required to protect from interference facilities proposed on or after the day the application or notification for the response booster is filed.

APPENDIX D

PROPOSED TEXT OF ATTACHMENT TO REPORT AND ORDER SETTING FORTH METHOD FOR PREDICTING ACCUMULATED SIGNAL POWER FROM A MULTIPLICITY OF STATISTICALLY-LOCATED TRANSMITTERS

Version 2.57 March 14, 1997

PROPOSED TEXT OF ATTACHMENT TO REPORT AND ORDER SETTING FORTH METHOD FOR PREDICTING ACCUMULATED SIGNAL POWER FROM A MULTIPLICITY OF STATISTICALLY-LOCATED TRANSMITTERS

Major Steps

In carrying out the interference studies required in this section, the aggregate power of the interfering signals to be expected from the response station transmitters shall be determined using a process comprising three major steps, as described below. First, a grid of points statistically representative of the distribution of transmitters to be expected within the response service area shall be defined. Second, any regions and any classes of response stations to be used shall be defined. Third, the equivalent power of each of the representative transmitters shall be determined and used in the various required interference studies.

Defining Grid of Points for Analysis

Since it is impossible to know *a priori* where response stations will be located, a grid of points is used to represent statistically in a relatively small number locations the potentially much larger number of response stations that are likely to be installed in the areas surrounding each of them.

Defining the representative grid of points to use in all the interference studies required in Sections 21.909 and 74.939 begins by geographically defining the response service area (RSA) of the response station hub (RSH). This can be done using a list of coordinates, a radius from the response station hub location, a line on a map, or a similar method sufficient to allow others to duplicate the interference studies to be conducted. Similarly, the coverage areas of any sectors in the RSH receiving antenna must be described geographically. Any overlaps of the sector patterns should be bisected in order to provide definitive borders for interference analysis purposes. The polarization in each sector must be identified.

The RSA may be subdivided into regions to allow different characteristics to be used for response stations in different portions of the RSA. (For details on regions and their use, see the section below on Defining Regions and Classes for Analysis.) Any regions to be used when analyzing interference must also be described in a manner similar to that used to describe the RSA itself. Analysis of the regions involves use of one or more classes of response station characteristics that include combinations of the values for maximum antenna height and for maximum effective isotropic radiated power (EIRP) and of the worst case antenna patterns that will be allowed in practice in installations of response stations associated with the various classes within the respective regions. (For details on classes and their use, see the section below on Defining Regions and Classes for Analysis.) Maximum numbers of simultaneous transmissions from response stations associated with each class within each region must be specified as part of the application process.

A line is established surrounding the RSA, following the shape of the RSA boundary, ½ mile outside the RSA, and never more than ½ mile from the RSA boundary at any point. This is termed the "measurement line" and will be used in determining that an adequate number of points representing transmitters is being used in the interference analyses. A starting point is defined on the measurement line due north (true) of the response station hub. A series of measurement points is then spaced along the measurement line with the starting point being one of those points. The measurement points must occur at least every ½ mile along the measurement line or every 5 degrees (as seen from the response station hub), whichever yields the largest number of measurement points. When an RSA has a non-circular shape, the choice of distance along the measurement line or angle from the response station hub must be made for each portion of the line so as to maximize the number of measurement points in that portion. The measurement points are to be described by their geographic coordinates. (The results of this method are that, for a circular RSA, a minimum of 72 measurement points will be used, and that, for portions of the measurement line of any RSA more than 5.73 miles from the response station hub, the distance method will be used.)

Now, a grid of points is defined within the RSA to statistically represent the response stations. The grid uses uniform, square spacing of the points with the first square surrounding the RSH and with its points equidistant from it. The lines connecting the points on one side of any grid square point true north, east, south, or west. The grid is defined so as to include all points within or on the boundary of the RSA. Any points falling at locations at which it would be physically impossible to install a response station (such as in the middle of a lake, but not the middle of a forest) are removed from the grid. The points of the grid are to be described by their geographic coordinates.

The grid of points is then divided into two groups. The division is to be done using a checkerboard (or quincunx) pattern so that alternating points along the east-west and north-south axes belong to opposite groups and points along any diagonal line belong to the same group.

The combination of the grid of points within the RSA and the points on the measurement line is next used to determine that the number of grid points is truly representative of a uniform distribution of response station transmitters within the RSA. This is done by conducting a power flux density analysis from each grid point within the RSA to each point on the measurement line. For this analysis, a single response station should be assumed to be located at each grid point, the response station having the combined worst case antenna pattern without regard to polarization of all response station classes assigned to that grid point and the maximum EIRP of any response station class assigned to that grid point. (For details on the method for determining the combined worst case antenna pattern, see the section below on Defining Regions and Classes for Analysis.) The response station antennas all should be oriented toward the response station hub.

The analysis should be done using free space path loss over flat earth only and should not include the effects of terrain in the calculation of received signal levels. At each point on

the measurement line, the power flux density from all grid points in each group of the checkerboard pattern should be aggregated. This is done by converting power received from each assumed transmitter from dBW/m^2 to W/m^2, summing the power in W/m^2 from all transmitters in each group, and then converting the sum back to dBW/m^2.

Once the aggregated power flux density from each of the two groups has been calculated, the received power flux densities from the two groups are compared at each of the points on the measurement line. The power flux densities from the two groups must be within 3 dB of one another at each of the points on the measurement line. If they are within 3 dB at every measurement point, a sufficient number of grid points is included for use in further analyses. If they are not within 3 dB at every measurement point, a larger number of grid points (i.e., closer spacing of grid points) must be used so that the 3 dB criterion is met.

Defining Regions and Classes for Analysis

To provide flexibility in system design and to assure that the clustering of response stations likely within higher population density areas is properly reflected in interference analyses, regions may optionally be created or may be required within response service areas. Regions may be of arbitrary size, shape, and location but must be evaluated on the basis of the uniformity of their population densities in order to preclude unidentified clustering of response stations. The territory within a region must be contiguous. Regions within a single RSA may not overlap one another. Within regions, response stations are apt to be randomly distributed and for analysis purposes are to be assumed to be uniformly distributed. Regions are to be defined by their boundaries in the same manner as is the response service area. (For details on describing boundaries, see the section above on Defining Grid of Points for Analysis.)

While regions may be established virtually arbitrarily, they must be tested to determine that the population densities they represent are reasonably uniform. This is done using postal zip code territories. For each postal zip code within a region, the population of the zip code and its area (in square miles or square kilometers) are used. If a zip code is divided between two (or more) regions, the proportion of the zip code area falling in each region should be calculated and the same proportion of the population of the zip code then should be ascribed to each associated region.

The test for population density uniformity consists of calculating the population density of each zip code within a region and dividing it by the average population density of that region taken as a whole. The resulting value must be three (3) or less. The required relationship can be expressed by the following inequality:

$$\frac{\left(P_{zip}/A_{zip}\right)}{\left(P_{region}/A_{region}\right)} \leq 3$$

Where

P_{zip} = *Population in Zip Code*

A_{zip} = *Area of Zip Code* $\left(mi^2 \text{ or } km^2\right)$

P_{region} = *Population in total Region*

A_{region} = *Area of total Region* $\left(mi^2 \text{ or } km^2\right)$

Within each region, at least one class of response station with defined characteristics must be specified to balance the interference expected to be caused and the types of installations to be made. The classes are to be used in interference analyses and to provide limitations on the installations that may be made in the related region. The characteristics of each such class of response stations will include the maximum height above ground level (AGL) for antennas, the maximum effective isotropic radiated power (EIRP), and the combined worst-case antenna radiation pattern – for each polarization when both are used – for all response stations of that class installed. For each defined class of response stations within a region, the maximum number of such response stations that will transmit simultaneously on any channel or subchannel must be specified.

The combined worst-case antenna radiation pattern is required to be specified collectively for all of the classes of response stations located at each grid point (in the procedure above, in the section on Defining of Grid of Points for Analysis, for confirming that the required number of grid points is specified) and individually for each of the classes defined for each region of the RSA. In the case of the collective pattern used to determine adequacy of the number of grid points, if both polarizations are used in the system, the horizontal and vertical patterns of each antenna should be treated as deriving from separate antennas and should be combined with one another and with the patterns from all the other antennas at that grid point. In the case of the individual patterns for each class used for interference analyses, if both polarizations are used in the system, the horizontal and vertical combined worst-case patterns should be determined separately for all classes defined. Similarly, the cross-polarized worst-case pattern should be determined for each polarization.

These combined worst-case patterns are derived by setting the maximum forward signal power of all antenna types to be used within the class or classes to the same value and then using the highest level of radiation in each direction from any of the antennas as the value in that direction for the combined antenna pattern. The same method is used to determine both plane- and cross-polarized patterns, which are used separately in interference analyses. The combined worst-case plane- and cross-polarized patterns for each class will be used in all of the interference studies and are not to be exceeded in real installations of response stations within a class to which the pattern applies.

Calculating Aggregated Power from Transmitters

The final major step is the calculation of the effective isotropic radiated power (EIRP) to be attributed in each regional class to each of the grid points in the various interference studies so as to be representative of the number of response stations that are expected to

be in operation simultaneously within the RSA. This calculation starts by assigning a number of transmitters in each regional class to each grid point. The population of response stations is assumed to be uniformly distributed within each region, therefore divide the number of simultaneous transmitters specified in each regional class by the number of grid points in the region and assign the resulting number to each grid point. If there are no grid points within a region, assign the number of simultaneously operating transmitters equally to those grid points immediately surrounding the region in addition to those assigned to them from the regions within which they are located. If a specific location is known for one or a group of transmitters, an additional point off the grid may be established to represent them. The total number of transmitters assigned to the grid points and any additional points must equal the maximum number of transmitters specified to be in operation at one time on each channel or subchannel.

Next, the total EIRP to be assumed for each regional class at each of the grid points or additional points for interference studies is calculated. This is done by converting the maximum EIRP for each regional class at each grid point or additional point, expressed in dBW, to Watts, multiplying by the number of simultaneously operating transmitters in the regional class assigned to that grid point or additional point, and converting the resulting power in Watts back to dBW. The values so calculated are the aggregate powers of all the response station transmitters of each regional class represented by each grid point or additional point.

In a system using both polarizations, the response stations represented by each grid point are to be assumed to use the polarization of the response station hub antenna sector in which they are located. The appropriate plane-polarized or cross-polarized combined worst-case antenna pattern is to be used in interference studies depending upon the polarization of the station receiving interference. In a system using only one polarization, the effect of antenna sectors can be ignored and the choice between plane- and cross-polarization patterns made identically for all grid points with respect to any particular neighboring system.

Finally, the aggregate power of each regional class at each grid point is used in conducting the required interference studies described in this section. For example, to determine that the -73 dBW/m^2 limitation is met, a field strength contour is calculated by first calculating a matrix of field strengths from each regional class at each grid point in the RSA in the region of the PSA or other boundary to be protected using an appropriate terrain-based propagation analysis tool (e.g. free space path loss plus reflection and multiple diffractions). The matrix represents an array of locations on a square grid separated by a short distance (no more than ½-mile). Once the matrix is calculated for each regional class at each grid point or additional point, the matrices are summed by first converting from dBW/m^2 to W/m^2, adding the field strength values from all regional classes at all grid points at each matrix point, and converting from W/m^2 back to dBW/m^2. The summed matrix is then used to route a contour by interpolating between matrix points. The contour so determined should not cross the boundary under consideration.

Similar methods should be used in conducting the other interference studies required in this section. These include the desired-to-undesired (D/U) signal ratio studies for co-channel and adjacent channel interference. In all of these studies, the analysis should use the aggregate power of each regional class at each grid point or additional point, the worst case plane- or cross-polarized antenna pattern, as appropriate, for each regional class, with the antennas at each grid point aimed toward the response station hub, and the maximum antenna height above ground specified for each regional class at each grid point or additional point.